

## Osteoporosis

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Osteoporosis is defined as a condition characterised by low bone mass, leading to a decline in the bone's microarchitecture and an increased risk of falls. This condition affects predominantly Caucasians, women and older people. As the life expectancy increases worldwide, the prevalence of osteoporosis is also expected to double by 2025. According to the recent statistics provided by the International Osteoporosis Foundation, 1 in 3 women and 1 in 5 men over the age of 50 years are likely to be affected. Just as hypertension has a very high likelihood of resulting in a stroke, osteoporosis can culminate into an increased risk of falls and thereby fractures. Thus, it becomes paramount to gain information on this condition.

Bone metabolism involves a balanced cycle of bone formation and resorption. The skeletal system is the only reservoir of serum calcium in the human body. However, calcium ions have an important role to play in the cross bridge cycle that results in skeletal muscle contraction. Thus it is understood that calcium ions are required by the body for day to day functioning and wear and tear activities. The two factors that cause imbalance in normal bone metabolism are: ageing and menopause. Oestrogen is a hormone involved in calcium metabolism, and its decline after menopause leads to an increased bone resorption; so does ageing. This has led to a misconception that osteoporosis is a women's disease, although this is not true as it can affect men older than 50 as well. Broadly, osteoporosis is classified as: primary osteoporosis (postmenopausal and senile variants) and secondary osteoporosis (resulting due to causes apart from ageing and menopause, such as vitamin D deficiency, high salt intake, prolonged immobilisation, alcohol abuse, decreased physical activity, malabsorption syndromes etc).

The only clinical manifestation of osteoporosis is a fracture, usually one that occurs with trivial injuries; as the bone quality has deteriorated. Due to degenerative processes occurring in the neuromusculoskeletal system with ageing, elder people are susceptible to falls, and osteoporosis contributes to morbidity and disability in such cases. Thus it becomes important to identify at risk individuals and take preventive measures.

The Gold standard of osteoporosis risk detection worldwide is the measurement of Bone Mineral Density (BMD) by Dual x-ray Absorptiometry, typical sites utilised being the hip and the spine (as the susceptibility of osteoporotic fractures is high in these areas). The resultant is in terms of Standard Deviations (SD) of where the difference between the patient's BMD and the mean BMD of a reference population falls (matched in terms of age and ethnicity) on a bell curve. It is denoted in negative SDs, and is known as the T-score. The interpretation is as follows:

t-score more than or equal to -1.0 → Normal BMD

t-score between -1.0 to -2.5 → Osteopenia

t-score equal to or less than -2.5 → Osteoporosis

However, this method is applicable only for postmenopausal women above 50 years of age. For any other population, WHO recommends calculating Z-score [1-3].

As mentioned earlier, due to the absence of any obvious clinical manifestations other than a fracture, osteoporosis is a condition that needs screening, early detection and preventive measures rather than treatment/rehabilitative ones. Once identified via DEXA BMD, the following measures are recommended to be followed by guidelines developed by various regional bodies operation under the International Osteoporosis Foundation:

1. Administration of anti-resorptive agents, such as bisphosphonates and oestrogen. These chemicals influence osteoclast function and reduce the rate of bone absorption. When the body fails to adequately produce these, they need to be administered externally. Some international guidelines even recommend this to be the first line of management.
2. Vitamin D and Calcium supplements: these are other agents that, if the body's stores are inadequate, need to be compensated extraneously. Vitamin D is crucial for absorption of calcium from dietary sources in the intestine, whereas calcium is the building block of bone tissue. The recommended dosage is 1000-1200 mg/day for calcium and 400-600 IU/day for Vitamin D. Additionally, Vitamin D has other sources, such as production by skin under sunlight exposure, saltwater fish, egg yolk, liver, fortified foods.
3. Weight bearing exercises: there is evidence suggesting that weight bearing exercises stimulates bone formation, calcium deposition in the bones and indirectly increases calcium absorption from dietary sources. Other benefits include neuromuscular strength and agility development, which in turn will help to decrease the risk of falls. Some evidence also exists in favour of non-weight bearing, high intensity resistance training of lower limbs.
4. Prevention of falls: this involves mitigation of multiple risk factors such as lack of assistive devices, slippery environs, poor vision, imbalance and incoordination, deconditioning etc. Appropriate measures need to be taken.
5. Limiting alcohol, caffeine and tobacco intake: these are known factors adversely affecting bone metabolism, and their intake needs to be curbed. As is aptly said, prevention is better than cure, and awareness precedes action. So let us take some crucial steps towards awareness, detection and ultimately prevention of this disease.

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